

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[THIRD SERIES.]

No. 56. AUGUST 1862.

VIII.—*On the Age of the New South Wales Coal-Fields.*

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To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,

In the February Number of the 'Annals' (No. 50) you have printed a communication from Professor M'Coy of Melbourne, in which, under the head of the "Upper Palæozoic" and "Mesozoic" Periods, he introduces some remarks reflecting upon the differences of opinion existing between himself and me respecting the position of the Coal-beds of New South Wales, and marking by *italics*, not only in the text, but in the notes, certain expressions which appear to me as unjust to himself as they are also to me.

When the paper, from which the portion is republished, first came out, I replied in the postscript of a "Review of Recent Geological Discoveries in Australasia" (a copy of which I herewith forward to you), read before the Philosophical Society of New South Wales in November 1861, to the italicized passages in Professor M'Coy's essay of which I complained; and in the body of my paper I made reference to the state of the question as to the evidence obtained. You will, probably, be willing to do me the justice of allowing the readers of Mr. M'Coy's remarks to know what may be said on the other side. But I hope you will also allow me to add in this communication a brief reply to the notes in pp. 142, 143, 144, which I had not seen till I read them in your Journal.

The existence of the differences of opinion between Mr. M'Coy and some geologists at home, as well as here, is too well known to make necessary any further recapitulation of them than may be found in my publication above mentioned.

Mr. M'Coy, in 1847, maintained that our New South Wales
Ann. & Mag. N. Hist. Ser. 3. Vol. x.

coal was "*Oolitic*," and as recently as August 18, 1857, he stated before the Select Committee of the Melbourne Parliament that the coal in Victoria, which he considers the same as that in New South Wales, is "*really to be compared to those thin Oolitic coal-fields on the Yorkshire coast.*" There can be no mistake as to this being the position he assigned to our Coal-beds *less than five years ago.*

To this I was all along opposed; and, from circumstances in the experience of numerous other geologists (among them Jukes, Stutchbury, Dana, &c.), as well as my own, in common with them, I held the opinion, right or wrong, that our New South Wales coal is not "*oolitic*," but very much older, lying as it does over an enormous area in immediate juxtaposition with and succession to beds which Mr. M'Coy and other geologists in England have regarded as "*Palæozoic*" and *Lower Carboniferous.*

All Mr. M'Coy's knowledge of the fossiliferous evidence on this question, previously to his arrival in Victoria, was derived from the examination of collections I had sent to England. Since his arrival, his attention has been directed to the palæontological evidence collected in Victoria; but he has never yet set foot on the New South Wales territory, and consequently knows nothing whatever, by observation, of the position of the Coal-beds of this colony. I admit, nevertheless, it is *possible* he may be right in his views, and that all observers in New South Wales have been wrong. But when he quotes, in his note at p. 142, evidence from Victoria, and puts in italics the assertion that "*no such sectional evidence has been found by Mr. Selwyn, the Government Geologist [of Victoria], in his careful surveys of the coal-bearing sections of Victoria and Tasmania,*" it must be borne in mind that this assertion is without any weight as concerns Victoria, because Mr. Selwyn himself has stated in print, in the same 'Catalogue of the Victorian Exhibition, 1861,' in which Mr. M'Coy's original paper appears, that "*the only fossils that have been found*" in the Upper Palæozoic rocks of Victoria are a *Cyclopteris* and *Lepidodendron*, and even the position of these is assigned as "*only provisional*;" "they may," he says, "be Lower Mesozoic." How, then, can "*sectional evidence*" from Victoria be used in argument, seeing that there no *zoological* fossils to compare with those of New South Wales? As to Tasmania, Mr. Gould agrees with me rather than with Mr. Selwyn.

I have published a list of beds at Stony Creek, near Maitland, in which the Palæozoic fossils are found over and below and around a set of coal-beds having the same general dip and disarrangements as the supposed older beds; and in the Coal-beds occur the plants which Mr. M'Coy, up to 1857, considered the

equivalents of those in the cliffs near Scarborough. In Mr. M'Coy's note he rejects this list, because a section of the neighbourhood for twelve miles or more had been exhibited to show the *position* of the Coal-beds, and this was not drawn on equal scales, and because a fault occurs at Bed No. 5, as any one could see from the fact of the dip mentioned at the head of the list. But this fault, which cuts through all the beds alike, could not put younger beds under older.

Mr. M'Coy thinks I have relied solely on this section; but there are many other localities in New South Wales which speak as mysteriously as Stony Creek, though no particular notice of them has been as yet taken in discussions. There does not appear to me anything more anomalous in finding an intercalation or a colony of so-called Jurassic plants in so-called Lower Carboniferous beds, than in finding the Carboniferous fauna amidst the Belemnite-beds of Savoie. But I am quite ready to give up Stony Creek on sufficient proof that its evidence is not trustworthy.

A kind of charge against my *honesty* is alleged in the note at p. 143. This demands an explanation. In 1849 I requested the late Admiral P. P. King to take with him to England some additional New South Wales fossils. Among them was a supposed *Lepidodendron*, found by my late friend Leichhardt about seventy-five miles from the coal-beds of Mount Wingan, and only a short distance from another locality where the supposed Jurassic fauna exists. Mr. M'Coy rejected this, not solely because it did not come from the *Glossopteris*-beds, but (though he says nothing about it in his paper) because, as I did not find it myself, it was not admissible in evidence, and because it was probably a European specimen, being like *L. tetragonum* of the English coal-fields! It is clear, therefore, that, in 1849, Prof. M'Coy did not believe in the existence of any Upper Palæozoic plants in New South Wales.

Since that time, Mr. Stutchbury and myself collected such *Lepidodendra* abundantly, as may be seen by reference to our Geological Reports. One was figured by Mr. Stutchbury in 1853. In 1835, Sir T. L. Mitchell discovered one. In 1852 I found, in the same beds at Goonoogoonoo with the *Lepidodendron*, a *Knorria* and a *Syringodendron*, which Mr. M'Coy himself saw and recognized at Melbourne in 1860; and in 1855 I exhibited at Paris a *Sigillaria*, not formed from "*misconceptions of portions of ordinary Mesozoic forms*," as is hinted in the note at p. 143, but acknowledged to be genuine articles of the New South Wales flora, though certainly the late Professor E. Forbes doubted the Leichhardt specimen to be a *Lepidodendron**; and

* Lectures on Gold, Lect. 2. p. 53.

since that, Mr. Salter has pointed out to me, in a letter, that there are essential differences between this plant and ordinary forms.

Whether, therefore, we are all right or all wrong, the sonorous periods in which Professor M'Coy introduces his Gipps Land *Lepidodendron* as the mate of the "only characteristic Palæozoic Carboniferous genus," and "of the same species as the *only Palæozoic coal-plant* ever collected in New South Wales," "found by the lamented Leichhardt near the borders of Queensland," *hundreds of miles from the beds containing the (as I believe) Mesozoic plants*, weigh but little with those who know (as Mr. M'Coy himself must know) that the actual position of the *Lepidodendra*-beds is as much in the dark as the antiquity of the *Glossopteris*-beds.

These beds are not actually identical. *And I have never said they were**; but I have held the opinion that they are both parts of a descending Carboniferous formation; and I know, from actual observation, that if the *Glossopteris*-beds lie immediately over the Lower Carboniferous fauna in the Illawarra and on the Hunter, so the *Lepidodendron*- and *Syringodendron*-beds lie over the Palæozoic Carboniferous fauna of the Peel River, for which Mr. Oederheimer's memoir in the 'Quarterly Journal of the Geol. Soc.' may be taken in evidence without consulting my own Reports. At this moment, Mr. M'Coy does not *know* with any precision what stratigraphical relationship exists between the beds with *Lepidodendra* and those with *Glossopteris*; nor does he *know*, from observation or geological sections, how far they are apart. A *Lepidodendron* has been reported to me from the *Glossopteris*-beds of Newcastle by the inspector of coal-fields; and from the same locality a *Palæozoic fish*, named by Agassiz and figured by Dana, was taken in a bed of shale filled with all the distinguishing plants of Professor M'Coy's *Oolitic* flora.

The discovery of a Secondary formation in Queensland during

* I have already affirmed the contrary. Neither in the list I gave of supposed genera in 1847, and of which some are held not to be verified, nor in the subsequent remarks upon it, is there any statement to show that they all came from the *same* beds. On the contrary, the localities mentioned are numerous and ranging over a very extensive area. It would be uncandid in the highest degree not to admit that there may have been *misconceptions* of genera in that list, made at a time when no reference could be had to collections for comparison. But *Lepidodendra* are mentioned from localities where they have since been verified. The "*Ulodendron* from Pine Ridge, Wellington," also agrees in geological position with *Lepidodendra* from numerous other localities. There are but *five* members out of the *twenty* that can justly be excluded. It must also be remembered that at that time I was single-handed, without a fellow-worker, and with no acknowledged palæontologist to appeal to. Moreover, greater mistakes than any alluded to have been made by *palæontologists of eminence*.

the present year, under my auspices, and by a friend of mine, the particulars of which I have given in p. 27, 'Recent Geological Discoveries,' &c., has not helped us out of our dilemma. Mr. M'Coy sees in it a total overthrow of my positions, and states that the Wollumbilla fossils "*are the marine equivalents of exactly the same age as that he assigns to the plant-beds, i. e. Lower Mesozoic, not older than the base of the Trias, and not younger than the lower part of the great Oolite.*"

In these fossils the Professor detected "numerous *Lower Oolite, Liassic, and Triassic* forms, and among them, a distinct species of the *Muschelkalk* genus *Myophoria*, &c." Now, if they are "the marine equivalents of exactly the same age" as the Scarborough Oolites, which was Mr. M'Coy's plant-horizon in 1857, how came the Liassic and Triassic, and especially the *Muschelkalk* species there? This apparent paradox is adroitly veiled under the word *Mesozoic*, which word has gradually crept into the discussion, and took precedence in 1860. "*Mesozoic*" everywhere supplants "*Oolitic*" in Professor M'Coy's present essay, and he speaks of his having held the same views respecting the "*Mesozoic*" plants in contradistinction to the Palæozoic fauna *fourteen years* ago, though, ten years after, he maintained the supremacy of the "*Yorkshire Oolite.*"

It is, notwithstanding this convenient merging of the Scarborough horizon in Mesozoic indistinctness, perfectly clear that if I have adopted "a new view" (p. 144, *note*), so has Professor M'Coy; and as he is happy in knowing that I have done so, I am equally happy at finding that he is getting below the Oolite into a region where, perhaps, our views will meet after all.

Judging from my own examinations, and from the admission of Mr. Selwyn, I do not believe there is at present any evidence on which can be founded a thorough comparison in Victoria with facts patent in New South Wales.

In chap. xiv. of my 'Researches in the Southern Gold Fields of New South Wales,' I have stated as distinctly as I could the natural divisions in the series comprising the beds *above, with, and below* the coal-seams of that colony; and in the 'Quarterly Journal of the Geol. Soc.' vol. xvii. p. 358, &c., I have repeated that arrangement, specifying *only* the plants determined by M'Coy, Morris, and Dana in each division.

Now, according to my view, the Victoria Coal-beds belong to the upper and perhaps second division of the New South Wales series. In Gipps Land I know, from my own researches, that there do exist limestone-beds with fossils of Palæozoic age, *probably upper*; and it is in another part of that large region that Mr. M'Coy's *Lepidodendron* was found! But under the Victoria Coal-beds no such deposits have been found by the geologists of

that colony as occur in New South Wales, in the Illawarra, or about Maitland on the Hunter River. And from what I personally know, I believe the Gipps Land Upper Palæozoic Fauna is lower in the series than the beds just alluded to. Mr. Dana considered those Hunter-River beds to be either Carboniferous or Permian. If so, the beds above, including the coal-seam, may range from Permian to Triassic, or even higher. That is what I am willing now to admit, and, further, that it is *possible* the Wollumbilla rocks may be the equivalents of the Wianamatta, or upper, division of the New South Wales Carboniferous series.

But this at present is a matter of conjecture. Acknowledging the value of that discovery, and rejoicing to have been able to assist in it, I repeat that, at the present time, we do not know whether it bears or not on the actual subject of the controversy.

No palæontologist has yet compared the Queensland Carboniferous flora with that of New South Wales or Victoria; and we have yet to learn the accuracy of the information which I have collected and am now collecting by the aid of observers on the Maranoa and Fitzroy Downs, all of which, however, tends to show that the Wollumbilla "Lower Mesozoic fossils" come from a higher horizon than the *Urostheneis*- and *Glossopteris*-beds of Mulubimba.

Professor M'Coy states that I requested him to "determine the geological epoch to which the Wollumbilla fossils belong." I have never, in the recent controversy respecting the Coal-fields, done otherwise than request his determinations of fossils, thinking it due to him to lay all fresh information before him, and being willing to defer in *palæontological* questions to his judgment. But I retain to myself the right of forming an opinion as to the structure of a country with which I am familiar, and which he has never seen.

It is under this consideration that I now demur to the admission of inferences from the palæontology of distinct and widely separated districts without regard to the order or succession of deposits.

In conclusion, I think that I do not act otherwise than consistently in considering the question still an open question; and though much has been done to reconcile apparent differences, much more remains to be done before any dogmatic opinions ought to be proclaimed.

I have the honour to be, Gentlemen,

Your obedient servant,

W. B. CLARKE.

St. Leonard's, New South Wales,
April 26, 1862.